

Endoscopic Third Ventriculostomy as CSF Diversion in Hydrocephalus with Posterior Fossa Lesions

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ABSTRACT

Objective: The purpose of this study is to describe the role of External Third Ventriculotomy (ETV) for treating hydrocephalus before or during removal of posterior fossa tumor.

Design: Quasi experimental study.

Place and Duration of Study: Neurosurgery department Peoples University of Medical and Health Sciences for women Nawabshah, from 1st January 2009 to 31st December 2010.

Material and Methods: Patients were admitted for hydrocephalus with posterior fossa tumors. Endoscopic third ventriculostomy performed and posterior fossa tumors were excised completely or partially. Post operative persistent hydrocephalus was treated with repeat ETV or VP shunt.

Results: The study population consisted of 8 patients with male preponderance (6 males 75% and 2 females 25%). Age group included 5 months to 40 years with mean age 20.2 years. 7 patients (87.5%) did not require postoperative shunting.

Conclusion: ETV is an alternative and effective method of treating hydrocephalus associated with posterior fossa tumors avoiding external drains or shunts. It decreases the risk of post-resection hydrocephalus.

Key words: Hydrocephalus, Neuroendoscopy, Endoscopic third ventriculostomy (ETV), posterior fossa tumors.

INTRODUCTION

The hydrocephalus is associated with posterior fossa lesions in 80% of cases.¹ It needs diversion either by external drain, shunt,² or endoscopic third ventriculostomy.³⁻⁶ Sometimes no treatment is offered preoperatively and persistent progressive hydrocephalus is observed in 25 – 30% of these cases which requires VP shunt or EVD.³ External drains are subject to complications such as infection, and over drainage. ETV is an internal physiologic CSF diversion for such obstructive hydrocephalus.^{7,8}

The purpose of this study is to describe ETV as an alternate and effective method of treating hydrocephalus associated with posterior fossa lesions.

MATERIAL AND METHODS

This study was conducted in Neurosurgery ward Peoples

Medical College Nawabshah from 1st January 2009 to 31st December 2010.

Patients with obstructed hydrocephalus due to posterior fossa lesions were included. Patients with GCS less than 7 and having systemic problems (uncontrolled diabetes, uremia, hepatic failure, recent myocardial infarction) were excluded.

Diagnosis was established with CT scan or MRI. ETV was performed before resecting the posterior fossa tumor.

Surgical Technique

Aesculap rigid endoscope of 0 degree was used. ETV was performed through right pre-coronal incision. Fenestration was made in the floor of third ventricle in front of mamillary bodies and behind the infundibular recess with Fogarty catheter 6FR. Balloon inflated to

widen fenestration (5 mm to 8 mm).

Success of third ventriculostomy with clinical improvement, radiological decrease in ventricular size and shunt independence was determined.

RESULTS

Sex Incidence

Over a period of two years we had 8 patients consisting of 6 (75%) males and 2 (25%) females with male to female ratio (3:1) (Table 1).

Table 1: Sex Incidence.

Sex	No.	Percentage
Male	6	75%
Female	2	25%
Total	8	100%
Ratio of female to Male 3:1		

Age Incidence

Age group included 5 months to 40 years with mean age 20.2 years (Table 2).

Table 2: Age Incidence.

Age: 5 to 40 years	Mean age 20.2 years.
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In 2 patients with tough membrane at the floor of 3rd ventricle bipolar diathermy probe was used to achieve the initial perforation, which was then enlarged by inflating the balloon of the Fogarty catheter. In these patients special care was taken to prevent plunge in high bulging basilar artery.

All patients had simultaneous excision (partial or total) of posterior fossa tumor in prone or lateral position.

Histopathology

Acoustic shown are 5 (37.5%) cases, medulloblastoma 2 (25%) and Cerebellar astrocytoma 2 (25%) were the common pathology. There was one case of Dandy Walker Cyst (Table 3).

Table 3: Type of Posterior Fossa Lesion.

Type of	No.	%
Acoustic Neuroma	3	(37.5%)
Cerebellar Astrocytoma	2	(25%)
Medulloblastoma	2	(25%)
Dandy Walker malformation	1	(12.5%)
Total	7	(100%)

Outcome

The improvement in hydrocephalus was determined by clinical as well as radiological means. Reduction in ventricular size was observed in **7 patients (87.5%)** and postoperative shunting or drainage was not required in these cases.

Demographic pattern of this study is summarized in table 1.

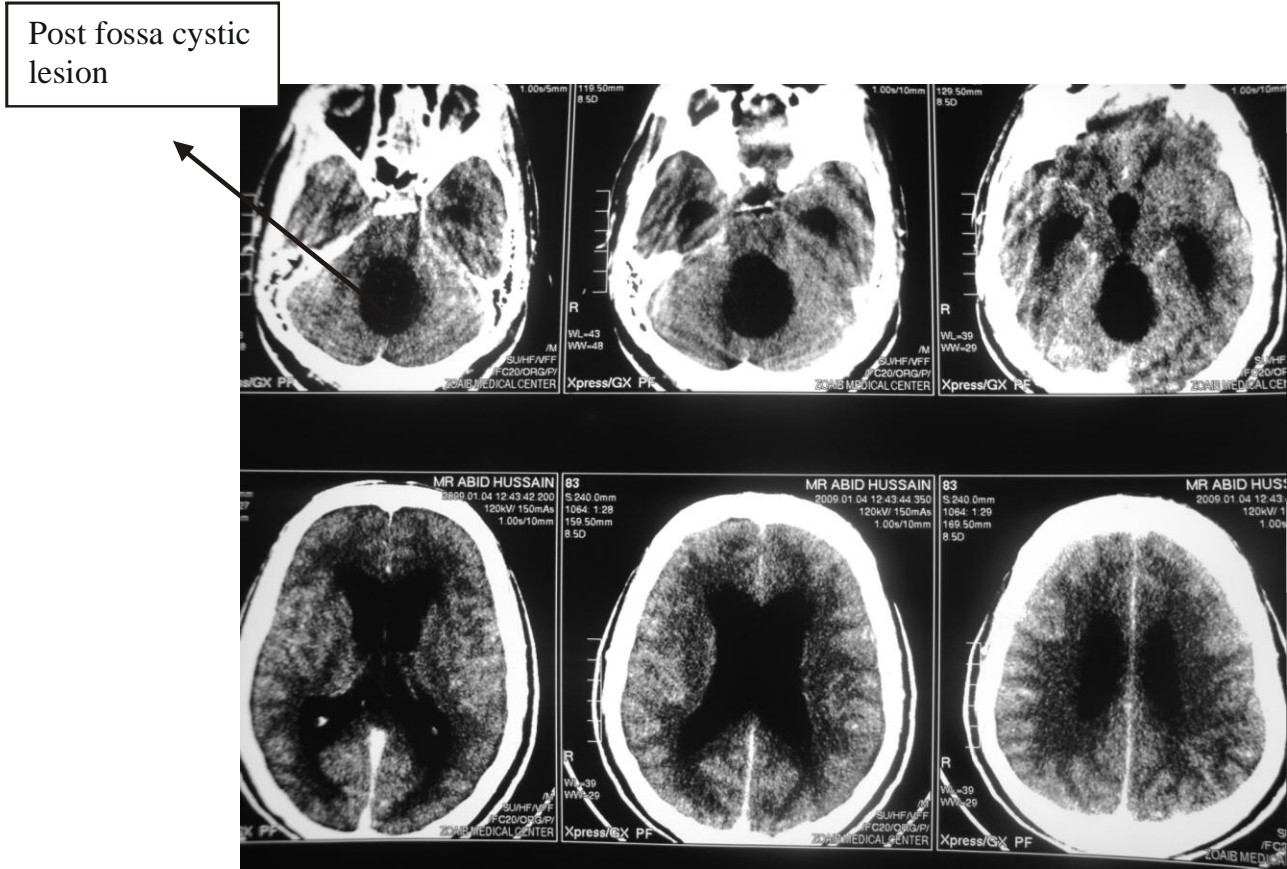
Photographs 1, 2, 3 illustrate one case in which hydrocephalus was treated with ETV and subsequently cystic tumor was excised.

DISCUSSION

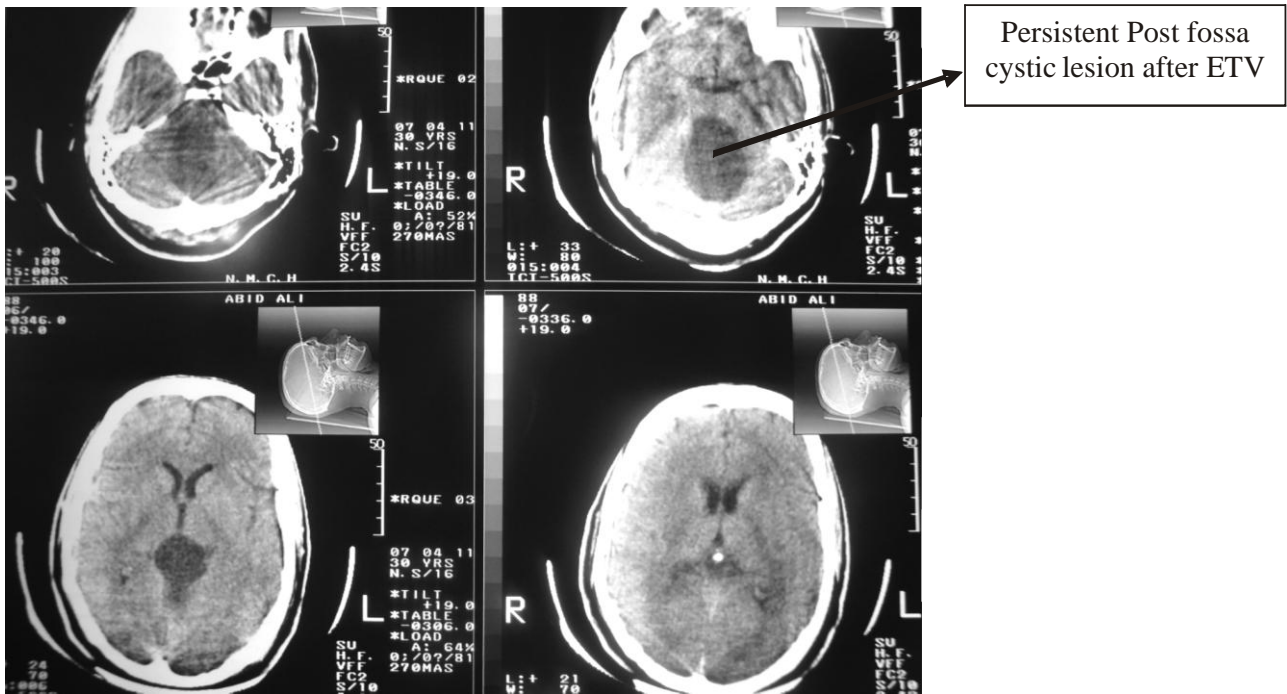
The majority of posterior fossa tumors, especially mid-line tumors are associated with obstructive hydrocephalus. Patients with very large ventricles and very large tumors are more likely to need permanent hydrocephalus treatment postoperatively. It is opined that removal of these tumors obstructing the fourth ventricle convert hydrocephalus from obstructive to communicating, which requires surgical treatment if the CSF volume exceeds a certain level.¹⁰ Culey et al¹¹ have analyzed factors determining the need for VP shunts after posterior fossa tumor surgery in children. According to them age younger than 3 years at diagnosis, tumors affecting midline structures, subtotal tumor resection, prolonged requirement of an EVD, pseudomeningocele formation, and CSF infections are significant factors associated with the need for postoperative shunt placement.¹⁰

According to Firtsch³ ETV is not a standard pre-resectional operation. It is only suitable for patients with fourth ventricle outflow obstruction and persisting or progressive hydrocephalus following tumor removal.

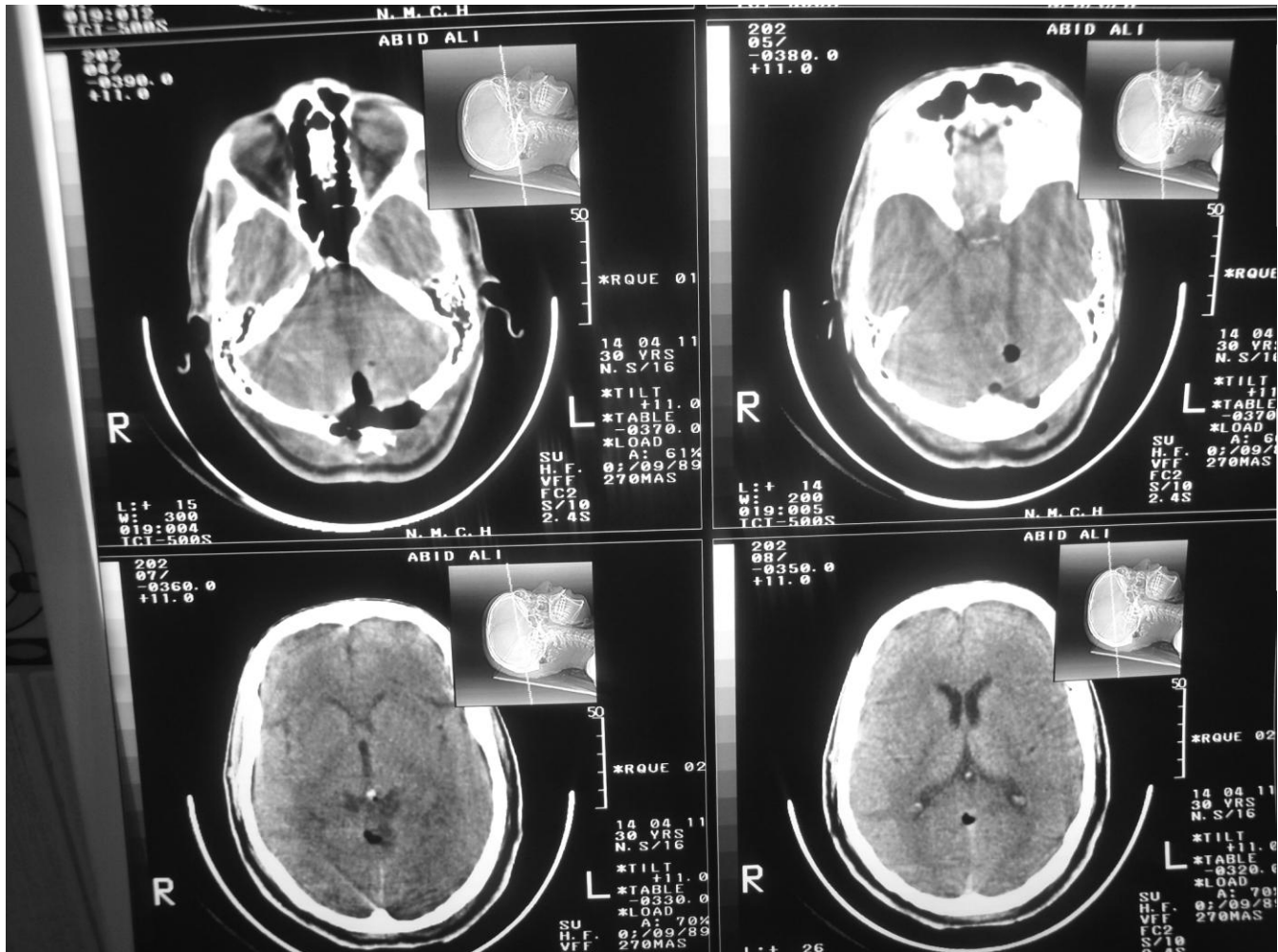
El-Ghandour NM¹² preferred ETV over VP shunt in the management of midline posterior fossa tumors



Photograph 1: CT scan showing hydrocephalus with posterior fossa cystic lesion.



Photograph 2: CT scan showing resolution of hydrocephalus after ETV and persistent posterior fossa cystic lesion.



Photograph 3: CT scan showing excision of posterior fossa cystic lesion.

in children because of shorter duration of surgery, the lower incidence of morbidity, the absence of mortality and the lower incidence of procedure failure. Our experience of ETV in treating hydrocephalus with posterior fossa lesions also encourages the usage of ETV.

Pre or per-operative CSF diversion decreases ventricular size and cerebellar swelling and helps in exposing the posterior fossa tumors. In contrast some authors claim upward herniation, intra-tumoral bleed and infection due to pre-craniotomy CSF diversion.¹² Authors had not encountered such complications in this series.

Rigid and flexible endoscopes are being used. We have used rigid 0 degree endoscope and fenestration at 3rd ventricular was made with Fogarty balloon.

The success rate of pre-resectional ETV in posterior fossa tumors mentioned in the literature varies from 75% – 87%.^{8,9,13} In our study 7 patients (87.5%) did not require post-resection CSF diversion.

CONCLUSION

The Endoscopic Third Ventriculostomy was found an alternative and effective method of treating hydrocephalus with posterior fossa lesions before excising the tumor. It provided an intracranial CSF diversion and freedom from shunt dependency. It eliminated risk of over drainage and CSF infection related to external drainage. It decreased the risk of post-resection hydrocephalus.

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